departure from primitive simplicity, but there seems no reason for calling it a sham, in cases where both types are used constructively. The "general reader" may certainly be justified in passing over the "approximate theory" of the strains of arches, but the subject of pendentives (in p. 95) is more to the point, having very important relation to the construction of cupolas. Much more seems to be made in the criticism on the shams of St. Paul's (p. 98) than the subject warrants. The design is blamed because the interior cupola is distinct from the external. There would be as much reason to blame the magnificent central towers of some of our cathedrals because the open lantern chamber over the crossing does not rise to the summit of the tower or spire. The author, however, duly praises Sir Christopher Wren's first design, the Greek cross plan, of which a good judge, the late Rev. J. L. Petit, has maintained that if this design had been executed it would have been the finest interior in the world. On the subject of vaulting (pp. 107-116), the development of which is well and clearly followed out, it is stated that the pointed arch was *invented* for the purpose of facilitating the construction. This could hardly have been the case, because the pointed arch had been used in the East long before the period referred to; but its great applicability to that favourite architectural feature was then recognised, and when once introduced for constructive reasons, it soon began to influence the whole structure.

In p. 125 commences a chapter on the theory and use of mouldings, which play so important a part in architectural design that it is quite essential that an amateur who desires to form a right judgment on architectural subjects, either historically or critically, should study their development and application; he will find the subject clearly and logically explained in this chapter. In chapter v. are some judicious remarks on ornament, showing on the one hand that however valuable a help it may be, the art is really independent both of sculpture and carved ornament, and that the latter is inferior in expression to mouldings properly used. In pp. 184-188 are some just views on the combination of architecture with scenery. Without going so far as to say that a spire on a hill—such, for instance, as Harrow—must necessarily be ill-placed, the statement of the incongruity of this feature in a mountainous country may be supported by citing the example of incongruous effect of the Ambleside spire in a Westmoreland valley.

The work ends with an historical sketch, which shows much thought and learning. The author can, however, scarcely be correct in speaking of such structures as the Treasury of Atreus at Mycenæ as formed of large blocks of masonry with no architectural details whatever. It is possible that the ornate elaboration of the Beehive tombs at Mycenæ and Orchomenus, as shown in Perrot and Chipiez' work, before referred to, may be a good deal exaggerated; but there certainly exists evidence for a very considerable amount of architectural embellishment. In speaking of the derivation of the Corinthian capital, it seems unnecessary, with the small amount of evidence to the contrary which exists, to relegate to the regions of fable the touching little story told by Vitruvius (chapter iv. p. 1) of its invention by Callimachus, especially as the earliest known example, in the temple at Bassæ, was the work of a contemporary, and probably a friend of the reputed inventor.

In p. 255 the very important derivation of the dome is traced from the Pantheon, of which the date (in the reign of Hadrian) has lately been established, and then the addition of the spherical pendentive by Justinian's architect (Anthemius of Tralles) in the great church of St. Sophia. To this is added the derivation of the architecture of the Western churches—which is traced—following Prof. Baldwin Brown ("from the Schola to Cathedral"); from the Roman house, of which the atrium and peristylium became the forecourt or parvis and the porch, whilst the basilica supplied the apse, and the widening of the basilica on each side of the tribunal gave the germ of the transepts of our cathedrals. In the summary of the different contributions made by the European nations to Gothic architecture, Italy is denied altogether a specimen of true Gothic—and yet it possesses in Milan Cathedral an interior perhaps more impressive than that of any other church.

"PARTURIUNT MONTES."

The Story of the Plants. By Grant Allen. (London: George Newnes, Limited, 1895.)

MR. GRANT ALLEN tells the story of plants in a readable and very inaccurate manner. The keynote to his work is struck in his preface, in which he informs his reader that he has "wasted comparatively little space on mere structural detail," and, later on, that he makes "trivial sacrifices of formal accuracy" in order to expound general biological relationships. It is true that he apologises for these amiable little weaknesses, but adds, in the same breath, that he lays before his "untechnical readers all the latest results of the most advanced botanical research." It is impossible to avoid giving some samples of these "latest results."

For Mr. Grant Allen, the plant is essentially the *green* plant, and the essential function of this plant is constructive metabolism. On the other hand the animal is the very opposite of this, "he is a destroyer, as the plant is a builder." But we fancy most people will hardly admit this antithesis nowadays. Plants and animals both exist by breaking down complex bodies to simple ones, but plants as a whole can get the energy required for first building up these complex bodies at a less expensive outlay than animals, and the green plants, as Mr. Allen perfectly correctly observes, are further able to make use of sources of energy (*i.e.* vibrations of ether) from which their less fortunate relatives are debarred. But to draw the distinction just quoted as the *essential* difference between the two kingdoms, is obviously misleading. However, Mr. Allen is at least consistent in his views, since he states that the first plants "must have been green."

In the account given of the *modus operandi* of the building up of organic matter in the plant, the author's claims to up-to-date knowledge will, we fear, hardly be admitted. Chlorophyll is said to be the active agent in splitting up (under the influence of sunlight) the carbon dioxide and water to form starch. Now every student knows that chlorophyll can do no such thing, and further he knows, or should know, that starch is certainly not a primary product of assimilation. The latter, perhaps,

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is a "trivial detail," but Mr. Allen hastens to insist on the importance of "living chlorophyll" as the "original manufacturer and prime maker" of all the material of life, either vegetable or animal. Evidently chlorophyll is here doing duty for the alliance of chlorophyll with a vastly more important substance, protoplasm, but the author could hardly expect "untechnical readers" to appreciate this ; and his statement that chlorophyll is a variety of protoplasm will certainly not meet with the assent of botanists. Again, the statement that "plants alone know how to make protoplasm" is one which is contradicted, fortunately for us all, by the experience of daily life ; in order, however, that we may be quite clear as to the author's conception of protoplasm, he defines it (in italics) as "*the only living material we know*" ; and this would seem to make it clear that he had not by a *lapsus calami* written protoplasm when he meant proteid. For a continuation of this subject, the critical reader may refer to pp. 190-191.

When Mr. Allen comes to deal with what we gather from his preface he considers the most important part of his work, we find evidences of hasty generalisations on insufficiently ascertained facts. Many plants which are certainly not degenerate, are regularly self-fertilised ; and we submit that in most districts in England the humble bee has far more to do with the fertilisation of the Tropæolum than the Humming-bird hawk-moth ; and this latter insect is certainly *not* the only one in Europe capable of performing this office.

But it is needless to multiply examples further. All we can say is that those readers who are ignorant of the real facts may find the book pleasant, though we can hardly add profitable, reading.

OUR BOOK SHELF.

Low's Chemical Lecture Charts. (London : Sampson Low, Marston, and Co., 1895.)

THIS is a series of diagrams intended to illustrate various chemical and metallurgical processes and apparatus, and designed more especially for the use of teachers who are preparing students for the examinations of the Science and Art Department, the London Matriculation, Oxford and Cambridge Local, &c.

There is no doubt that a good set of useful diagrams, of convenient size and moderate price, would be gladly welcomed by a large number of teachers, but the charts before us can scarcely be said to fulfil all the requirements of such a set of diagrams. The size of the sheets, namely, 30 in. × 40 in., is sufficiently large for the use of such classes as they are intended for, and it does not render them too bulky for convenient storage. In most cases the illustrations are very roughly executed enlargements of familiar cuts from various text-books and treatises on chemistry, sometimes well chosen, sometimes not. Many of the sheets contain several pictures, and where it happens that the subjects represented are in a manner related, this does not detract from their merit, except in so far as it necessitates the illustrations being smaller than if each occupied a single sheet. But in a number of instances the subjects depicted on the same diagram have no connection ; thus, on the same sheet we find a representation of Hofmann's apparatus for showing the volume composition of water, and illustrations of certain apparatus used by Dewar in making experiments at low temperature.

Again, another diagram contains the following illustrations : (1) Hofmann's apparatus for composition of sulphur dioxide ; (2) ozone apparatus ; (3) apparatus for composition of ammonia ; (4) apparatus for composition of hydrochloric acid ; (5) Andrews' and Tait's ozone tube ; (6) apparatus for composition of nitrous oxide ; (7) Smithell's flame cone separator. With so many illustrations on one sheet, 30 in. × 40 in., each one must be almost insignificantly small, and quite erroneous ideas of the relative sizes of various pieces of apparatus are likely to be conveyed to the student. With some of the figures still more serious exception must be taken ; thus, Fig. 2, Sheet 14, depicts a piece of apparatus, the design of which is of more than questionable feasibility ; while Fig. 2, Sheet 17, is an impossible arrangement.

Many of the metallurgical figures are badly chosen. Thus, the old method for extracting zinc, known as "distillation per descensum," which has been quite obsolete for many years, is brought to life again in Diagram No. 11.

If these diagrams were a little better executed, and could be purchased singly, they would be of much more service to the general run of teachers, who could then select from a catalogue such as they might require.

G. S. N.

Brasilische Pilzblumen. Von Alfred Möller. Mit 8 Tafeln. (Jena : Gustav Fischer, 1895.)

THIS volume forms the seventh part of the "Botanische Mittheilungen aus den Tropen," edited by Prof. Schimper, of Bonn. The title—"Fungus-Flowers"—is suggestive of a popular and æsthetic treatment of the subject, but this impression is somewhat misleading, for Dr. Möller's work is of a strictly scientific character, and appeals more especially to systematic mycologists. At the same time, the extraordinary forms of the Fungi described give a considerable degree of general interest to the book, which is enhanced by the pleasant style in which the subject is treated. Dr. Möller is already well known for his mycological investigations, particularly for his fascinating work on the cultivation of Fungi by South American ants. The "Fungus-Flowers" are simply gastromycetous fungi of the family Phalloideæ, of which that repulsive plant the "Stinkhorn" (*Ithyphallus impudicus*) is the best-known British representative.

The author has been most fortunate in his investigation of the remarkable Brazilian forms of this family, which includes perhaps the most highly differentiated of the Fungi. He has founded no less that four new genera on his discoveries. One of these (*Protubera*) is referred to the Hymenogastreæ, and is of special interest, for it appears to connect that family with *Clathrus* among the Phalloideæ. The other new genera (*Blumenavia*, *Aporophallus*, and *Itajahya*) are members of the Phalloideæ, *Blumenavia* showing affinity with *Clathrus*, while the remaining two belong to the tribe Phalleæ. Eight new species are described in all.

The book is full of interesting details of the occurrence and mode of growth of these Fungi. It is illustrated by eight fine plates, many of the figures in which are from photographs of the specimens, while others represent their more minute structure. The first plate, a coloured representation of "the most remarkable of all Fungi," *Dictyophora phalloidea*, is especially striking. This is not one of the new species, but has never been adequately figured before. This extraordinary fungus bears a general resemblance to *Ithyphallus*, but is distinguished by the presence of an immense net-like indusium surrounding the stem, from which it stands out like a crinoline. The German colonists at Blumenau have given it the name of "the veiled lady."

Dr. Möller's book will be indispensable to students of mycology, and will no doubt attract more general attention to a most interesting group of plants, about which much still remains to be discovered. D. H. S.

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